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ABSTRACT

This article consists of general and specific descriptions of seven Computer Assisted Instruction programs currently used by students. The programs are intended primarily for prospective teachers, but students in other areas such as business and the social sciences have also found them to be useful. Two of the programs deal with the structure of precise instructional objectives; one deals with the cognitive domain; one deals with measurement and evaluation; and three deal with curriculum decision making. The programs include a variety of instructional formats and can serve both as instructional and demonstration programs. (Author)

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CAI FOR PROSPECTIVE TEACHERS

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CAI FOR PROSPECTIVE TEACHERS

A series of CAI program intended for use by prospective teachers is currently in use at Illinois State University. These programs will be made available to MICC users and the purposes of this paper are to describe the programs, to invite others to use them, and to request feedback concerning their applicability to teacher education programs at other institutions.

General Description

The programs deal with topics which are generic to the teaching-learning process rather than specific to particular subject areas. These topics include the structure of precise instructional objectives, the levels within the cognitive domain, measurement and evaluation, Flanders' Interaction Analysis, and curriculum decision making. The generic nature of the programs should facilitate their use in general methods courses such as Secondary Education Methods and in specific methods courses such as Math Methods. The utilization of the programs in both general and specific methods courses would not be inconsistent provided any repetition of skill development was noted and intended.

The programs were originally designed to supplement the secondary education program at ISU but they can stand alone. In some programs there are references to specific texts and/or activities which may or may not be available at other institutions. These references however, are supplementary in nature and can be disregarded without damaging the structure of the programs.

With the exception of one FORTRAN program the programs are written in BASIC and take students about twenty minutes each to complete. If desired, the programs can be made available, at cost, in punched card form. Descriptions of each program follow.

Specific Descriptions

Program Name: OBJ

Program Topic: The Structure of Precise Instructional Objectives

Program Objective: To enable students to specify, via the computer terminal, the structural weaknesses, if any, that exist in at least 80 percent of a given series of objectives.

Students begin by inputting their names and then opting to either review the structure of precise instructional objectives or to bypass the review. The review is extensive enough to enable students to be successful in the remainder of the program even if they had little or no previous knowledge of objectives. The review is presented via a tutorial format and the purpose of the format is explained to students in order to broaden their understanding of CAI programming techniques.

Once students either go through or bypass the review they are presented (via a modified drill and practice format) with a series of objectives and a constant set of weaknesses common to objectives (such as 'lacks an observable behavior,' or 'lacks a minimum acceptable standard'). Reinforcement and/or corrective feedback is provided following each student response. Following completion of the first series of objectives the program prints out a list showing which objectives were missed and an analysis showing which specific kinds of weaknesses the student had the most trouble with.

If students miss more than 20 percent of the items they receive remediation based on the analysis of their areas of weakness. Following the remediation students are presented with a second series of objectives and the cycle of response, feedback, and analysis is repeated. If students miss more than 20 percent of the items this time they are referred to a faculty member for further help. Students achieving the 80 percent criterion level on the first set of objectives have the option of bypassing the second set.

Program Name: COG

Program Topic: The Cognitive Domain

Program Objective: To enable students to specify, via the computer terminal, the cognitive level of at least 80 percent of a given series of objectives.

Although the content of this program deals with differentiating levels within the cognitive domain, the programming strategy paralles the previous program. There is an extensive, by optional, review utilizing a tutorial format followed by two series of objectives. The response-feedback-analysis cycle utilies a modified drill and practice format and as in the previous program the various programming formats are explained immediately prior to their use in order to help students increase their understanding of CAI.

Program Name: TEST

Program Topic: Measurement and Evaluation

Program Objective: To enable students to select the definitions of, and/or apply, via the computer terminal, at least 80 percent of a given series of terms common to measurement and evaluation.

Students begin this program by inputting their names. The program then prints out a list of twenty terms basic to measurement and evaluation. Using an inquiry format students request definitions and explanations of any terms they desire. After students review what they want they are presented with a series of situations in which they must apply or define the terms. Reinforcement and/or corrective feedback is provided following each student response.

After completing the modified tutorial section students receive an accounting of the items they missed and an analysis of their areas of weakness(es). They are told, for example, they are weak in the area of reliability/validity, the area of standardized tests, the area of statistics, etc. Students are also given the option of additional review of their area(s) of weakness.

Program Name: IACTION

Program Topic: Flanders' Interaction Analysis

Program Objective: To generate for students an analysis of their data reflecting verbal interaction.

At the request of Dr. Robert Fisher, a faculty member in the Dept. of Curr. & Inst. at ISU, a problem-solving program was constructed which enables students to input the data they record as they chart verbal interaction in a class and receive a printed analysis of that data. Since the program (which is written in FORTRAN) calculates interaction matrices and makes various correlations more students are able and willing to use Flanders' Interaction Analysis than was previously the case.

Program Name: THEA, THEB, THEC

Program Topic: Curriculum Decision-Making

Program Objective: To introduce, and give students an opportunity to implement, the Edwards Decision-Making Model.

To date, the most ambitious CAI application in the area of secondary education at ISU is in the area of curriculum. At the request, and with the assistance of, Dr. Clifford H. Edwards, three contiguous CAI programs were developed to help students understand the Edwards decision-making model and to give them practice in using that model.

In the first program (THEA) students opt either to receive or to bypass an extensive review of the components of the Edwards decision-making model (EDMM). Continuing in a tutorial format students then "walk through" a hypothetical situation using the model and receive feedback concerning the interaction of their various en-route decisions.

The second and third programs (THEB and THEC) are parts of a single simulation program in which students apply the EDMM to a given situation and receive feedback concerning the internal logic and the consequences of their decisions.

Invitation to Teacher Educators (and other interested parties)

As stated earlier, the CAI programs described in this paper are currently in the MICC system. Teacher educators and other interested parties are cordially invited to try any or all of the programs. The programs can be used as supplements to current course work, as examples of different programming stategies, or in the cases of programs OPJ and COG, as sources of primary information.

Additional information concerning the programs and access to them is available by writing to Michael A. Lorber, DeGarmo Hall 525, Illinois State University, Normal, Illinois 61761.

Request for Feedback

Although all of the programs described have been field tested at ISU there is no doubt that they can be improved and polished further. To this end it would be most helpful if those individuals using the programs provided feedback concerning the success their students had with the programs, average completion times, and the extent to which the programs fit into the existing teacher education program at their particular institution. Comments about the programs and suggestions for improvement would, of course, be sincerely appreciated.

PROGRAM SYNOPSIS -- OBJA

Program Name -- OBJA

Program Language -- BASIC

Program Title -- The Structure of Precise Instructional Objectives

Intended Users -- Students interested in learning to communicate instructional intent clearly and concisely. No previous experience with objectives is needed.

General Objectives -- To familiarize the student with the components of precise instructional objectives and with CAI as an instructional tool.

Precise Objective -- To enable the student to specify, via the terminal, the weakness(es), if any, in at least 80 percent of a given series of objectives.

Program Structure -- The program consists of four main parts:

1. Introduction
   - A. Explains the operation of the CAI terminal, the general and precise objectives, and the programming formats used in the program.
   - B. The student inputs his name and verifies the entry.
2. Review/Instruction (Tutorial Format)
   - A. This section is optional but the student is encouraged to go through it since it is extensive enough to enable him to complete the program successfully even if he has had no previous experience with objectives.
   - B. Observable terminal behaviors, conditions, and minimum acceptable standards are defined, explained, and exemplified.
   - C. Questions and feedback are intended to help the student learn how appropriate objectives are written and why some objectives communicate instructional intent more powerfully than others.
3. Instruction/Evaluation (Modified Drill and Practice Format)
   - A. The student uses these options to evaluate each of a series of objectives:
     - (1) Observable behavior missing or unclear.
     - (2) Conditions missing or unclear.
     - (3) Minimum acceptable standard missing or unclear.
     - (4) Both 1 and 3.
     - (5) The objective is acceptable as written.
   - B. Corrective and/or positive feedback follows each student response.
   - C. Following the first series of objectives the student is given an accounting of the items he missed and a review of those components which were the source of most of his errors.
   - D. If the student reaches the 80 percent criterion level he may choose to do a second series of objectives or to move directly to the final review.
   - E. If the student does not reach the 80 percent criterion level he is automatically given a second series of objectives. Feedback is provided.
4. Conclusion
   - A. The components of precise instructional objectives and the programming formats used in the program are reviewed.
   - B. The student is referred to his instructor, the program author, and to a specific text for further information and/or in-depth work.

Average Completion Time -- About 20 minutes.

Utilization -- This program may be used alone, in conjunction with classroom instruction, or in conjunction with programs OBJB and/or COG.

Program Author -- Dr. Michael A. Lorber, DeGarmo Hall, Illinois State University, Normal, Illinois 61761

PROGRAM SYNOPSIS -- OBJB

Program Name -- OBJB

Program Language -- BASIC

Program Title -- Precise Instructional Objectives

Intended Users -- Same as program OBJA.

General Objectives -- Same as program OBJA.

Precise Objective -- Same as program OBJA.

Program Structure -- Same as program OBJA except for the following points:

1. The review section goes beyond explaining observable terminal behaviors, conditions, and minimum acceptable standards, and discusses the problem of objectives that call for two different behaviors (The student will demonstrate the ability to write objectives by underlining the observable behaviors in six given objectives.).

2. The options the student uses to evaluate each objective are:
   A. Lacks an observable terminal behavior.
   B. Lacks a minimum acceptable standard.
   C. Both 1 and 2.
   D. Calls for two different behaviors.
   E. The objective is acceptable as written.

Average Completion Time -- About 20 minutes.

Utilization -- This program may be used alone, in conjunction with classroom instruction, or in conjunction with programs OBJA and/or COG.

Program Author -- Dr. Michael A. Lorber, DeGarmo Hall, Illinois State University, Normal, Illinois 61761

PROGRAM SYNOPSIS -- COG

Program Name -- COG

Program Language -- BASIC

Program Title -- The Cognitive Domain

Intended Users -- Students interested in learning to diversify the kinds of thinking skills they will require of their students. No previous experience with the taxonomy of educational objectives or with the cognitive domain is needed.

General Objectives -- To familiarize the student with the function and levels of the cognitive domain and with CAI as an instructional tool.

Precise Objective -- To enable the student, via the terminal, to classify as to appropriate cognitive level at least 80 percent of a given series of objectives.

Program Structure -- The program consists of four main parts:

1. Introduction
   - A. Explains the operation of the CAI terminal, the general and precise objectives, and the programming formats used in the program.
   - B. The student inputs his name and verifies the entry.
2. Review/Instruction (Tutorial Format)
   - A. This section is optional but the student is encouraged to go through it since it is extensive enough to enable him to complete the program successfully even if he has had no previous experience with the taxonomy of objectives or with the cognitive domain.
   - B. The functions of the cognitive, affective, and psychomotor domains are explained and the levels of the cognitive domain are defined, explained, and exemplified.
   - C. Questions and feedback are intended to help students learn the differences between levels of the cognitive domain.
3. Instruction/Evaluation (Modified Drill and Practice Format)
   - A. The student uses these options to classify each of a series of objectives.
     - (1) Knowledge
     - (2) Comprehension
     - (3) Application
     - (4) Analysis
     - (5) Synthesis
     - (6) Evaluation
   - B. Corrective and/or positive feedback follows each student response.
   - C. Following the first series of objectives the student is given an accounting of the items he missed and a review of those levels which were the source of most of his errors.
   - D. If the student reaches the 80 percent criterion level he may choose to do a second series of objectives or to move directly to the conclusion.
   - E. If the student does not reach the 80 percent criterion level he is automatically given a second series of objectives. Feedback is provided.
4. Conclusion
   - A. The function of the cognitive domain is reviewed.
   - B. The student is referred to his instructor, the program author, and to specific texts for further information and/or in-depth work.

Average Completion Time -- About 20 minutes.

Utilization -- This program may be used alone, in conjunction with classroom instruction, or in conjunction with programs OBJA and/or OBJB.

Program Author -- Dr. Michael A. Lorber, DeGarmo Hall, Illinois State University, Normal, Illinois 61761

PROGRAM SYNOPSIS -- TEST

Program Name -- TEST

Program Language -- BASIC

Program Title -- Measurement & Evaluation

Intended Users -- Students interested in learning basic measurement and evaluation concepts. No previous measurement or evaluation experience is needed.

General Objectives -- To familiarize the student with the definitions and functions of terms and concepts basic to educational measurement and evaluation and to familiarize him with CAI as an instructional tool.

Precise Objective -- To enable the student to select the correct definition of, and/or correctly apply, via the terminal, at least 80 percent of the measurement and evaluation terms presented.

Program Structure -- The program consists of four main parts:

1. Introduction
   A. Explains the operation of the CAI terminal and the general and precise objectives.
   B. The student inputs his name and verifies the entry.

2. Review/Instruction (Inquiry Format)
   A. The student is shown the 20 terms and concepts to be dealt with:

(1) Precise Instructional Objective	(11) Intelligence Test
(2) Measurement	(12) Achievement Test
(3) Evaluation	(13) Aptitude Test
(4) Honesty	(14) Mean
(5) Reliability	(15) Median
(6) Validity	(16) Mode
(7) Objective Test	(17) Normal Curve
(8) Subjective Test	(18) Standard Deviation
(9) Criterion-Referenced Test	(19) Percentile Rank
(10) Standardized Test	(20) Stanine

   B. The student is given the opportunity to see the definition and/or explanation of any or all terms.

3. Instruction/Evaluation (Modified Drill and Practice Format)
   A. The student responds to, and receives corrective and/or positive feedback concerning, questions dealing with the 20 terms and concepts.
   B. Following the student's last response he is given an accounting of the items he missed and, depending on his errors, a review of one or more of the following areas:
      (1) Reliability, validity, and general measurement and evaluation.
      (2) Various kinds of tests.
      (3) Elementary statistics.

4. Conclusion -- The student is referred to his instructor and/or to specific texts for further information and/or in-depth work.

Average Completion Time -- About 20 minutes.

Utilization -- This program may be used alone or in conjunction with classroom instruction. Programs OBJA, OBJB, and COG may be helpful.

Program Author -- Dr. Michael A. Lorber, DeGarmo Hall, Illinois State University, Normal, Illinois 61761

PROGRAM SYNOPSIS -- THEA

Program Name -- THEA

Program Language -- BASIC

Program Title -- Components of the Edwards Decision-Making Model

Intended Users -- Students interested in acquiring a conceptual model useful in making curriculum decisions.

General Objectives -- To familiarize the student with the components of the Edwards Decision-Making Model (EDMM) and with CAI as an instructional tool.

Precise Objective -- The student will be able, via the terminal, to correctly use the EDMM to make, and justify, a decision concerning a given curricular issue.

Program Structure -- The program consists of four main parts:

1. Introduction
   A. Explains the operation of the CAI terminal, the general and precise objectives, and the programming formats used in the program.
   B. The student inputs his name and verifies the entry.

2. Review/Instruction
   A. This section is optional but the student is encouraged to go through it as a comprehensive review.
   B. The components of the EDMM are defined and explained:
      (1) Issue
      (2) Assumptions
      (3) Validation
      (4) Criteria
      (5) Decision
      (6) Rationale
      (7) Evaluation

3. Evaluation (Tutorial/Simulation Format)
   A. The student is given a hypothetical curricular issue.
   B. As the student moves through the steps of the EDMM he is asked questions concerning the utilization of each step and is given corrective and/or positive feedback concerning his responses. The intent is to help the student understand the interrelationships among the steps of the EDMM.
   C. Following the last step the student is given an accounting of the errors he made and a review of the components of the EDMM which were the source of most of his errors.

4. Conclusion
   A. The student is referred to his instructor, the program authors, and to a specific text for further information and/or in-depth work.
   B. The student is informed that he should complete program THEB next.

Average Completion Time -- About 30 minutes.

Utilization -- This program may be used with or without supplementary classroom instruction, but it should be followed by programs THEB and THEC.

Program Authors -- Drs. Michael A. Lorber and Clifford H. Edwards, DeGarmo Hall, Illinois State University, Normal, Illinois 61761

PROGRAM SYNOPSIS -- THEB

Program Name -- THEB

Program Language -- BASIC

Program Title -- Using the Edwards Decision-Making Model, Part 1

Intended Users -- Same as program THEA.

General Objectives -- To provide the student with practice in using the Edwards Decision-Making Model (EDMM) and to familiarize him with CAI as an instructional tool.

Precise Objective -- To enable the student, given a hypothetical curricular issue, to specify, via the terminal, whether each of eight assumptions should be supported or rejected.

Program Structure -- The program consists of three main parts:

1. Introduction
   - A. The student inputs his name and verifies the entry.
   - B. The student is asked if he completed program THEA and if he has not he is encouraged to terminate THEB and complete THEA before attempting THEB.

2. Evaluation (Tutorial/Simulation Format)
   - A. The student is told that the hypothetical advisory committee he is serving on has decided to use the EDMM to reach a decision about an important curriculuar issue.
   - B. The student is given four pairs of assumptions pertaining to the 'pro' side of the issue and four pairs of assumptions pertaining to the 'con' side.
   - C. The student decides which of each pair of assumptions most powerfully argues for support or rejection and then receives feedback so he can see why his judgment agreed or disagreed that of the program authors.
   - D. Following the four pairs of assumptions pertaining to the 'pro' side of the issue and again following the assumptions pertaining to the 'con' side of the issue the student is given a cumulative accounting of the degree to which he has agreed or disagreed with the program authors. The intent is to help the student understand the reasoning behind each of the authors' decisions.

3. Conclusion
   - A. The student is given a final review of which assumptions were supported and which were rejected by the committee.
   - B. The student is asked to help the committee complete it's work by completing program THEC.

Average Completion Time -- About 20 minutes.

Utilization -- This program may be used with or without supplementary classroom instruction, but it should be preceded by program THEA and followed by program THEC. Programs THEB and THEC actually comprise a single simulation exercise.

Program Authors -- Drs. Michael A. Lorber and Clifford H. Edwards, DeGarmo Hall, Illinois State University, Normal, Illinois 61761

PROGRAM SYNOPSIS -- THEC

Program Name -- THEC

Program Language -- BASIC

Program Title -- Using the Edwards Decision-Making Model, Part 2

Intended Users -- Same as program THEA.

General Objectives -- Same as program THEB.

Precise Objective -- To enable the student, using the EDMM and the data from program THEB to specify, via the terminal, the priority arrangement of given criteria, and his decision.

Program Structure -- The program consists of three main parts:

1. Introduction
   - A. The student inputs his name and verifies the entry.
   - B. The student is asked if he completed program THEB. If he has not, he is asked to do so and program THEC terminates.

2. Evaluation (Tutorial/Simulation Format)
   - A. The student is given a brief review of the work already done by the hypothetical committee on which he is serving. He is referred to his THEB printout for a more detailed and complete review.
   - B. The student is given six criteria and asked to arrange them from most to least important. He is given feedback comparing his ranking with that of the program authors and is given an explanation of why the authors ranked the criteria as they did.
   - C. The student is asked to make his decision concerning the issue. He receives feedback explaining to what extent his decision is consistent with his top ranked criterion and with the status of the assumptions dealt with in program THEB.
   - D. The student is given the opportunity to reverse his decision and/or to see what would have happened if he had selected a different criterion as most important. Further feedback is provided.
   - E. The student is shown an excerpt which might be included in the rationale his committee writes. The excerpt explains the consistencies and inconsistencies concerning the decision, criteria, and assumptions. The intent is to help the student understand that the funtion of the rationale is to condense the reasoning used throughout the EDMM into a clear and concise whole.
   - F. The student receives an explanation of how the committee's decision might be effectively evaluated.

3. Conclusion
   - A. The components of the EDMM are reviewed.
   - B. The student is referred to his instructor, the program authors, and to a specific text for further information and/or in-depth work.

Average Completion Time -- About 20 minutes.

Utilization -- This program should follow program THEB.

Program Authors -- Drs. Michael A. Lorber and Clifford H. Edwards, DeGarmo Hall, Illinois State University, Normal, Illinois 61761